the above exemplary embodiments, but are defined only in accordance with the following claims and their equivalents.

What is claimed is:

1. A system for imaging a scene, comprising:

a radiation source capable of emitting radiation toward a scene from a plurality of angular positions;

a variable spatial resolution detector positioned to detect radiation transmitted through the scene and producing radiation transmission data representative of the intensity of the radiation transmitted through the scene;

a resolution controller in electrical communication with the detector, the resolution controller varying the spatial resolution of the detector in response to the angular position from which the radiation is emitted by the radiation source toward the scene; and

an image processor in electrical communication with the detector, the image processor receiving the radiation transmission data from the detector and producing an image of the scene.

2. The system claim 1, wherein the plurality of angular positions from which the radiation source is capable of emitting radiation toward the scene defines an arc about the scene.

3. The system of claim 1, wherein the radiation source is movable, the system further comprising a first motion controller coupled to the radiation source, the first motion controller moving the radiation source to the plurality of angular positions with respect to the scene.

4. The system of claim 3, wherein the plurality of angular positions are located in a plane extending through approximately the center of the radiation source and approximately the center of the scene.

5. The system of claim 3, wherein the plurality of angular positions define an arc about the scene.

6. The system of claim 5, wherein the arc spans a plane and has an axis of rotation on a line in the plane that is perpendicular to the scene and that extends through approximately the center of the scene.

7. The system of claim 5, wherein the first motion controller moves the radiation source in a series of steps of varying angular spacing along the arc.

8. The system of claim 7, wherein the scene is defined by a plurality of horizontal planes and wherein the angular spacing of the steps decreases as the first motion controller moves the radiation source from a first angular position substantially parallel to the plurality of horizontal planes to a second angular position substantially perpendicular to the plurality of horizontal planes.

9. The system of claim 3, wherein the detector is movable, the system further comprising a second motion controller coupled to the detector, the second motion controller moving the detector to a plurality of angular positions with respect to the scene in response to the angular position of the radiation source.

10. The system of claim 9, wherein the radiation source and the detector are movable in a plane and the second motion controller maintains the detector in a predetermined position with respect to the radiation source, the predetermined position being located along a line in the plane that is perpendicular to the radiation source and the detector and that extends through approximately the center of the radiation source and the detector.

11. The system of claim 3 wherein the detector is mechanically coupled to the radiation source and the first motion controller moves the detector in conjunction with moving the radiation source.

12. The system of claim 3 wherein the scene is defined by a plurality of horizontal planes, and wherein the resolution controller varies the resolution of the detector as the detector is moved from a first angular position substantially parallel to the plurality of horizontal planes to a second angular position substantially perpendicular to the plurality of horizontal planes.

13. The system of claim 1 wherein the radiation source is a source of x-ray radiation.

14. The system of claim 13 wherein the radiation source emits a total radiation dose which is less than or approximately equal to a dose of a standard screening mammogram.

15. The system of claim 1, wherein the detector is a two-dimensional detector.

16. The system of claim 1, further comprising an exposure control system in electrical communication with the radiation source, the exposure control system controlling the intensity of the radiation emitted by the radiation source.

17. The system of claim 1, wherein the detector produces noise less than or equal toapproximately a signal from 10 x-ray photons.

18. The system of claim 1, wherein the detector produces noise less than or equal toapproximately a signal from 1 x-ray photon.

19. The system of claim 1, wherein the scene is a three-dimensional scene and wherein the resolution controller controls the detector to produce high resolution radiation transmission data for two dimensions of the three-dimensional scene and low resolution radiation transmission data for a third dimension of the three-dimensional scene.

20. A method for imaging a scene, comprising the steps of:

irradiating a scene from a plurality of angular positions;

detecting radiation transmitted through the scene at a plurality of different spatial resolutions corresponding to the plurality of angular positions;

producing radiation transmission data representative of the intensity of the radiation transmitted through the scene at each of the plurality of angular positions; and

producing an image of the scene.

21. The method of claim 20, wherein the step of irradiating the scene further comprises the step of irradiating the scene using x-ray radiation.

22. The method of claim 21, wherein the step of irradiating the scene further comprises

the step of irradiating the scene using a total radiation dose which is less than or approximately equal to a dose of a standard screening mammogram.

23. The method of claim 22, wherein said standard dose is approximately 80 mrad per image.

24. The method of claim 20, wherein the plurality of angular positions forms an arc about the scene.

25. The method of claim 24, wherein the arc spans a plane and has an axis of rotation on a line in the plane that is perpendicular to the scene and that extends through approximately the center of the scene.

26. The method of claim 20, wherein the step of irradiating the scene further comprises the step of varying the angular spacing between the plurality of angular positions.

27. The method of claim 20, wherein the scene is a three-dimensional scene and wherein the step of producing radiation transmission data further comprises the steps of:

producing high resolution radiation transmission data for two dimensions of the scene; and

producing low resolution radiation transmission data for a third dimension of the scene.

28. A system for imaging an object, comprising:

a movable radiation source capable of directing radiation toward the object from a plurality of angular positions non-uniformly distributed about the object;

a detector movable about at least one axis so as to detect radiation transmitted through the object for each angular position of the radiation source, to create radiation transmission data; and

an image processor in electrical communication with the detector, the image processor receiving and analyzing said radiation transmission data to produce an image of the object.

29. The system of claim 28, wherein said detector is a low-noise digital detector.

30. The system of claim 28, wherein said angular positions define an arc about the object.

31. The system of claim 28, further comprising a motion controller coupled to the radiation source to move the radiation source to said angular positions.

32. The system of claim 28, wherein said angular positions are located in a plane extending through approximately the center of the radiation source and approximately the center of the object.

33. The system of claim 28, further comprising a second motion controller coupled to the detector to move the detector to a plurality of angular positions with respect to the object in response to the angular positions of the radiation source.

34. The system of claim 28, wherein said radiation source provides x-ray radiation.

35. A method of imaging an object, comprising the steps of:

irradiating the object from a plurality of non-uniformly distributed angular positions;

detecting radiation transmitted through the object for each of said angular positions to create radiation transmission data; and

constructing an image of the object by analyzing said radiation transmission data.

36. The method of claim 35, wherein said angular positions are selected to define an arc about the object.

37. The method of claim 35, wherein the step of irradiating includes selecting a total radiation dose delivered to the object to be approximately equal to a dose of a standard screening mammogram.

38. The method of claim 35, wherein the step of irradiating includes irradiating the object with

a first radiation dose at one angular position of the source and irradiating the object with a second radiation dose at another angular position, said second radiation dose being different from said first radiation dose.

39. A method of imaging an object, the method comprising the steps of:

irradiating the object multiple times, each irradiation being performed at a position angularly displaced from a previous irradiation position, said angular positions being non-uniformly distributed about the object;

detecting radiation transmitted through the object at each of said angular positions to create radiation transmission data; and

constructing an image of the object by analyzing said radiation transmission data.